

REMARKS

This amendment is submitted in an earnest effort to bring this case to issue without delay.

Applicants wish to reiterate their claim to the benefit of their German priority date of 11 September 2003 pursuant to the International Convention. A certified copy of German Patent Application 103 41 952.7 filed 11 September 2003 has been made of record in PCT/EP 2004/007912 of which the instant application is the US national Phase. The Examiner has already acknowledged Applicants' perfected right of priority.

Applicants have amended claims 1 through 4 and added new claims 5 through 8. Antecedent basis for the changes in claims 1 through 4 may be found in the specification on page 11, line 5, page 13, lines 9 to 27, and in claim 3 as originally presented. Antecedent basis for new claims 5 through 8 may also be found in the specification on pages 11 and 13. Thus claims 1 through 8 are now in this application and are presented for examination.

Applicants have corrected the errors on page 13 of the specification as referred to by the Examiner on page 2 of the office action. It is now clear that the temperature of the reaction between the polyol and the urea or carbamate is clearly influenced by the temperature and that there is a significant improvement in both product yield and in rate of reaction when the

temperature is above 150°C, than at 150°C, or below. Preferably the minimum temperature for the reaction is 200°C.

Applicants have amended claim 4 so that the claim is no longer an improper multiple dependent claim.

Applicants have obtained a complete copy of US Patent 4,443,622 to SMITH and are now making same of record. The Examiner apparently intended to cite US Patent 4,443,622, the SMITH patent, in the office action as a basis for the rejection of the claims last presented as anticipated under 35 USC 102 or as obvious under 35 USC 103. However, the patent cited by the Examiner is US Patent 4,443,621 to LAMATTINA et al, which on its face, appears to be non-analogous art. Applicants have checked the US Patent and Trademark Office, Patent Data Base, and it appears that under the IMAGE FILE Data Base for US Patent 4,443,622, the LAMATTINA et al patent and the SMITH patent have been improperly intertwined, making it impossible to obtain from the data base, an accurate copy of the SMITH patent.

In any event Applicants believe that no claim now presented should be rejected in view of the SMITH patent, either as anticipated under 35 USC 102 or as obvious under 35 USC 103.

Amended claims 1 through 4 are now limited to temperatures of above 150°C up to 270°C and polyether polyols of formula I in which R stands for a straight chain alkylene group having 2 to 12 carbon atoms and n is a number between 2 and 20, are no longer included in the claims. Paragraph 3 on page 13 of the specification states, that experiments have been carried out that

showed essentially no product-formation at 150°C. This clearly indicates that temperatures above 150°C are preferred. Claim 3 as originally presented and page 11, second paragraph of the specification, disclose an upper temperature-limit of 270°C. Above mentioned paragraph on page 13 as well as the second last paragraph on page 6 point out the improved effect of temperatures higher than 150°C and preferably of at least about 200°C.

According to In re Johnson and Farnham, 194 USPQ 187, 196 (CCPA 1977)) Applicants have every right to narrow the scope of their claimed polyether polyols of the formula I to no longer include such compounds in which R stands for a straight chain alkylene group having 2 to 12 carbon atoms and n is a number between 2 and 20, thereby distinguishing in terms of structure between the compounds of the present invention and those disclosed in SMITH.

Claims 2 through 4 as now presented are directed to a process for the production of a mixture comprising organic carbonates and carbamates, an example of which is shown on page 12 of the specification. The mixture as such is the subject of claim 1. This multicomponent mixture is very useful for example as an intermediate for the production of special carbonates like dimethyl carbonate or diphenyl carbonate by transesterification with the respective monofunctional alcohols. The manufacture of these special carbonates, i.e the subsequent transesterification of the multicomponent mixture with certain alcohols, is, however, the

subject of serial no. 10/571,479, which seems to be the reason for the double-patenting rejection (cf. below).

As disclosed in the RYU-reference cited by the Examiner, normally, carbamates are produced at a lower temperature followed by production of carbonates - from these carbamates - at higher temperatures (col.2, lines 26-28). That means, first an essentially pure carbamate is manufactured which is then converted in a second process and at different, i.e. higher, temperature to an essentially pure carbonate. Accordingly, the references SMITH and the British Patent 1,523,308 to BASF disclose processes to obtain essentially pure carbamates at temperatures of about 150°C. The BASF-process is explicitly concerned with the production of carbamates without the formation of by-products and constitutes a process conforming to the highest standards of purity (cf. page 3, lines 20-22). The process is carried out at temperatures of 100 - 160°C. In the examples, temperatures of or below 150°C are utilized. These reaction conditions lead to carbamates only, which can be seen from product-yield in the examples on pages 7 through 10 as well.

The SMITH process also uses temperatures of about 150°C (c.f. examples). In Example II a second reaction step is employed in Experiments C and D where the product is heated to 160°C for an additional 2 hours. However, the reference provides no motivation for using higher reaction temperatures, since a temperature of 160°C apparently does not significantly change the amount of residual urea compared to what can be achieved at about 150°C.

SMITH, col. 1, lines 16 - 18, shows that the carbamate is the intended final product of the process which the inventor had in mind. From this it can be deduced that the carbamate should be obtained in an essentially pure state. This deduction is also supported by col. 2, lines 18 - 19 where SMITH discloses that a relatively uncontaminated product may be obtained directly even though the process is carried out at molar ratios of urea to alcohol that are very near to 1:1. The contamination therefore relates to the remaining urea (cf. Also: residual urea in examples). This is in sharp contrast with the presently disclosed invention where it may be seen from the present application (p.13, pare 3) that a temperature of about 150°C is not very useful for the process of the present invention. Since SMITH specifically discloses only simple straight chain polyether polyols such as diethylene glycol, in his reaction with urea to form carbamates, in claims 1 through 4 Applicants removed these straight chain polyether polyols from the scope of claims 1 through 4 to clearly distinguish these claims over SMITH. Accordingly SMITH provides no basis to reject any of claims 1 through 4 under 35 USC 102 as anticipated or under 35 USC 103 as obvious..

The Examiner suggests that one skilled in the art would have taken the HARDER reference into consideration to convert the carbamates resulting from the SMITH process to prepare carbamates, to then prepare carbonates. Applicants disagree. HARDER is solely concerned with aliphatic alcohols (cf. column 1, line 50) which are rather short (column 2, lines 44 - 68) - there are no polymeric

multifunctional alcohols according to the present application. Furthermore, HARDER only utilizes monofunctional alcohols, not polyols. Therefore the product-mixture of the present invention comprising e.g. also cyclic carbonates cannot result. The use of polyfunctional alcohols is, however, advantageous as they can replace both amino-groups of the urea.

Nothing in the cited references points to the use of polymeric multifunctional alcohols in combination with urea in order to produce a mixture of carbamates and carbonates. There is no indication that the production of such a multi-component mixture would be useful at all.

Also in the present invention this mixture is only an intermediate product. Only through knowledge of its usefulness would one skilled in the art possibly have considered the combination of SMITH and HARDER to first produce an essentially pure carbamate at about 150°C, which would take about 6 hours (cf. SMITH, examples), and then partially convert the carbamate intermediate to carbonates at 160-220°C (cf. HARDER, col.3, line5), which would take approximately an additional 10 - 20 hours (cf. HARDER, examples). The presently claimed method, i.e. the direct one-step conversion of urea and alcohols to the multicomponent mixture, only takes about 5 hours.

The use of (exclusively) polymeric multifunctional alcohols in a single stage process (cf. page 10, para. 5) according to the present invention yields a mixture of carbonates and carbamates with high boiling points, which simplifies the removal

of ammonia (cf. page 8, last paragraph) because the loss of alcohols, carbonates and carbamates is minimized while at the same time the reaction can proceed quickly due to the relatively high temperature. The polar water-like structure of the alcohols improves the solubility of urea (cf. page 9, first para.) and the high stability of the multi-component mixture (cf. page 9, third para.) is important for recovery (circuit operation) of the alcohols after the back-formation in a second transesterification stage. In view of the above no combination of SMITH, HARDER and the BASF British patent provide any basis to reject any of claims 1 through 4 as now presented as obvious under 35 USC 103.

Applicants now turn to newly presented claims 5 through 8. Claims 5 through 8 have been drafted to focus on about 200°C as the minimum temperature for the presently claimed method. As has already been explained hereinabove, Applicants have found that both product yield and rate of reaction in the present method are significantly improved when compared with a reaction temperature of about 150°C as disclosed in SMITH. Since there is no disclosure or suggestion in SMITH to raise the temperature from about 150° to about 200°C in the one-step method to prepare carbamates and carbonates, and no suggestion that such a method would improve both rate of reaction and product yield, it is submitted that claims 5 through 8 are clearly patentable over all of the prior art of record taken individually or together.

Applicants ask that the Examiner reconsider his request that Applicants file a terminal disclaimer to avoid double

patenting of the obviousness-type should a patent issue in both the present application and in serial no. 10/571,476. The invention according to the present application is concerned with the production of a multi-component mixture of carbonates and carbamates with the above mentioned useful properties. Of course there is some significant overlap regarding the present application and the two co-pending applications 10/571476 and 10/571479 because the inventions claimed in the latter partly build upon the multicomponent mixture according to the present application. The manufacture of the multicomponent mixture, an intermediate product, is also disclosed in the co-pending applications which deal with the production of special carbonates and carbamates.

However, such special carbonate products are obtained only after another reaction step, namely transesterification. This is the important step disclosed in the process of the copending application that is carried out subsequently to the method according to the present application : The multicomponent mixture is reacted with monofunctional alcohols or phenols leading to the formation of special carbonates and back formation of the polymeric multifunctional alcohols of formulas I or II, which can be reused and cycled back. It is not obvious to produce the multicomponent mixture of the present invention and consequently it is not obvious to use it as an intermediate in the process according to the co-pending application because it is more difficult to handle such a mixture from an engineering standpoint than pure auxiliary materials.

The Applicants three US Patent Applications all have similar specifications but all claim different, patentably distinct parts of the overall inventive concept, which is a common strategy. The present application deals solely with the intermediate multicomponent mixture and its preparation, while another co-application focuses on the production of special carbonates and carbamates using the manufacturing process for the intermediate multicomponent-mixture as only part of the process claimed therein.

Applicants believe that all claims now presented are directed to allowable subject matter and a response to that effect is earnestly solicited.

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Enclosure:
US Patent 4,443,622 to SMITH

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